GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

BLEACHING TECHNOLOGY FOR TEXTILE

(Code: 3332801)

Diploma Programmes in which this course is offered	Semester in which offered
Textile Processing Technology	3rd Semester

1. RATIONALE

This course provides in depth knowledge about purification of all textile fibres, the chemistry and chemical technology involved in the application of various essential chemicals. The course also provides technological set up and knowhow for variety of preparatory processes. Thus it is a core course for textile processing engineers.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with the aim to achieve different types of skills so that students are able to acquire following competency:

- **Identify and remove impurities for improving quality of cotton, silk, wool, and synthetic materials for further processing operations.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
4	-	2	6	70	30	20	30	**150**

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** – Credit;; **ESE** - End Semester Examination; **PA** - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Introduction**	1a. Describe inspection process for Grey fabric visually and using machines, for removal of Impurities. 1b. Describe pretreatment for cotton, synthetics & their blends (yarn, woven & Knits)	1.1 Grey Inspection:- Point system, Tag system 1.2 Types of stitching 1.3 Segregation and rejection 1.4 Inspection machines for woven and knit goods. 1.5 Introduction & Importance of Pretreatments 1.6 Classification of Impurities 1.7 Various pretreatment sequences for cotton, synthetics & their blends (yarn, woven & Knits)
Unit– II **Mechanical Pretreatment**	2a. Explain purposes of Shearing, Cropping and Singeing. 2b. Describe various Shearing, Cropping machines. 2c. Describe singeing of different textiles,	2.1 Objects of Shearing, Cropping and Singeing 2.2 Working principle of Shearing & Cropping & Types of Shearing machines 2.3 Methods of singeing. 2.4 Various types of gas singeing machines and developments in singeing machines like direct and indirect singeing. 2.5 Singeing of yarn, woven & knitted Goods.
Unit– III **Chemical Pretreatments**	3a. Describe purposes of Desizing, Scouring & Bleaching Processes for different Textile Materials. 3b. Explain equipment being used for Desizing, Scouring & Bleaching Processes. 3c. Describe technology of Desizing, Scouring & Bleaching Processes for different Textile Materials. 3d. Describe defects of Desizing, Scouring & Bleaching.	3.1 Objects of desizing, Scouring & Bleaching. 3.2 Equipment for Desizing, Scouring & leaching Processes. 3.3 Classification & Chemistry of various Desizing agents. 3.4 Various practical methods of desizing. 3.5 Various stages of scouring for removal of impurities. 3.6 Recipe and functions of scouring bath ingredients. Solvent and solvent assisted scouring. 3.7 Chemistry of natural colouring matter and their removal, Concept of A.O.X 3.8 Classification & Chemistry of various Bleaching agents. 3.9 Scouring & Bleaching of Cotton, Polyester, Nylon, Acrylic and their blended woven fabrics. 3.10 Scouring & Bleaching of knitted goods and terry towels. 3.11 Scouring & Bleaching of Yarn dyed Fabric. 3.12 Environment friendly scouring & bleaching practices.

Unit	Major Learning Outcomes	Topics and Sub-topics
		3.13Batch wise, Semi – continuous & Continuous machines used for Scouring & Bleaching Process. 3.14Antichlor & Souring Process. 3.15Defects of Scouring & Bleaching process with their remedies.
Unit– IV **Mercerization**	4a.Describe purpose of Mercerization Process on yarn and fabric 4b.Explain different mercerization methods of yarn and fabrics. 4c.Describe various machines used for mercerization of yarn and fabrics.	4.1Objects of Mercerization. 4.2Concept of Hydrate formation & various types of cellulose conversions. 4.3Various factors affecting the process of mercerization. 4.4Concept of hot mercerization. 4.5Concept of liquid ammonia mercerization 4.6Yarn mercerization machines. 4.7Various types of fabric mercerization machines for woven fabrics. Mercerization machine for Knitted goods in tubular and open width form.
Unit – V **Pretreatments of Protein Animal fibre fabrics**	5a.Explain Pretreatment Process for Wool and Silk materials. 5b.Describe carbonization, degumming, and bleaching of Wool and Silk materials.	5.1Preparatory process sequence for woolen Goods & Silk Goods. 5.2Carbonisation of Wool 5.3Various methods of Degumming of silk. 5.4Bleaching of Wool & Silk

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I.	Introduction	04	2	2	2	06
II.	Mechanical Pretreatment	10	4	4	4	12
III.	Chemical Processing	24	8	10	12	30
IV.	Mercerization	12	4	6	4	14
V.	Pretreatments of protein animal fibre fabrics	06	2	4	2	08
	Total	**56**	**20**	**26**	**24**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revise taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills **(Course Outcomes in psychomotor domain)** so that students are able to acquire the competencies (Programme Outcomes). Following is the list of practical exercises for guidance.

Note: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

Sr. No.	Unit No.	**Practical/Exercise (**Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx Hours Required
1	I	Inspect Grey Fabric (Cotton, Synthetics & their blends, Wool & Silk)	02
2	II	Perform gas singeing of various Textile substrates.	02
3	III	Perform desizing of natural fibre fabric	02
4	III	Perform desizing of blended fibre fabric	02
5	III	Perform scouring of natural cellulosic fibre fabric	02
6	III	Perform scouring of Semi Synthetic fibre fabric	02
7	III	Perform scouring of Synthetic fibre fabric	02
8	III	Perform scouring of blended fibre fabric	02
9	III	Bleach natural fibre fabrics	02
10	III	Bleach semi synthetic & synthetic fibre fabrics	02
11	III	Bleach blended fabrics	02
12	III	Perform weight reduction of polyester fibre fabrics	02
13	III	Perform one bath combine bleaching of cotton/viscose rayon fibre fabrics	02
14	III	Perform two bath combine bleaching of cotton/viscose rayon fibre fabrics	02
15	III	Perform continuous bleaching of cotton/viscose rayon fibre fabrics	02
16	IV	Perform mercerization of cotton fibre fabric (slack & Tight)	02
17	V	Perform scouring of Wool fibre fabrics	02
18	V	Perform scouring of Silk (Degumming) fibre fabric	02
		Total	**36 Hours**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the proposed list of students' activities such as:

- Literature survey of preparatory processes for various textile fabrics.
- Collection and study of various preparatory process for different textile fibers
- Visit to textile industries to study impurities and improving quality of cotton, silk, wool, and synthetic materials, and prepare reports.
- Group discussion on recent Innovation in preparatory processes.
- Collection of data of various textile preparatory process & presentation on it.
- Seminar/Quiz/Presentation on recent developments in the field of preparation of textile.

8. SPECIAL INSTRUCTIONAL STRATEGY (If Any)

i. Arrange visit to nearby processing industry for demonstration of recent pretreatment processes and actual working of machines used for pretreatments.
ii. Show video clips of different pretreatment processes.
iii. Arrange guest lecturers from industry experts for awareness about contemporary practices in industries.

9. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr. No.	Author	Title of Books	Publication
1.	S. R. Karmakar	Chemical Technology in the pre-treatment process of Textiles	Elsevier Publication
2	Dr. V. A. Shenai	Technology of Bleaching (Vol-III)	Sevak Publication
3	J. T. Marsh	An introduction to Textile Bleaching	J. Wiley & Sons, New York
4.	E. R. Trotman	Textile Scouring & Bleahcing	B. I. Publication Pvt. Ltd.
5.	R. S. Prayag	Bleaching, Mercerising & Dyeing of Cotton Material	Shree J. Printers, Pune
6	R. S. Bhagwat	Handbook of Textile Processing Machinery	Colour Publication PVT. LTD., Mumbai

B. List of Major Equipment/ Instrument

i. Lab winch machine
ii. Lab jigger dyeing machine
iii. Water Heating Bath

C. List of Software/Learning Website

i. http://www. en.wikipedia.org
ii. http://textilefashionstudy.com
iii. http://textilelearner.blogspot.in
iv. http://www.niir.org
v. www. youtube,com

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. R D Joshi**, Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. C R Madhu**, Adhoc Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. J N Shah**, Assistant Lecturer, Textile Processing Dept., R C Technical Institute, Ahmedabad.
- **Prof. A S Shah**, Assistant Lecturer, Textile Processing Dept., Dr. S & S S Gandhy College of Eng. & Tech., Surat

Coordinator & Faculties from NITTTR Bhopal

- **Dr. C. K. Chugh**, Professor, Department of Mechanical Engineering
- **Prof. S. K. Gupta,** Professor and Coordinator for State of Gujarat